

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problems Mailbox.**

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION  
International Bureau



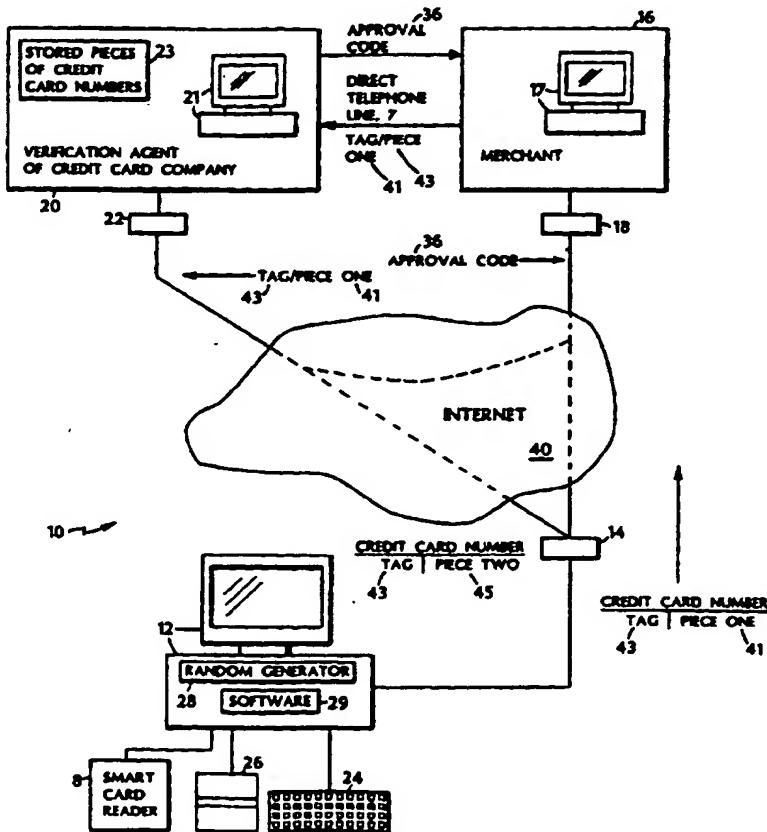
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> :	A1	(11) International Publication Number:	WO 96/29667
G06F 17/60, G06G 7/52, G06K 5/00, H04K 1/10		(43) International Publication Date:	26 September 1996 (26.09.96)
(21) International Application Number:	PCT/US96/03716	(81) Designated States:	AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).
(22) International Filing Date:	19 March 1996 (19.03.96)		
(30) Priority Data:	08/407,503 20 March 1995 (20.03.95) US		
(60) Parent Application or Grant			
(63) Related by Continuation			
US Filed on	08/407,503 (CIP) 20 March 1995 (20.03.95)		
(71)(72) Applicant and Inventor:	SANDBERG-DIMENT, Erik [US/US]; 699 Pomfret Road, Hampton, CT 06247 (US).		
(74) Agent:	FEIGENBAUM, David, L.; Fish & Richardson P.C., 225 Franklin Street, Boston, MA 02110-2804 (US).		

(54) Title: PROVIDING VERIFICATION INFORMATION FOR A TRANSACTION

(57) Abstract

Verification information is provided with respect to a transaction between an initiating party (12) and a verification-seeking party (16), the verification information being given by a third, verifying party (20), based on confidential information in the possession of the initiating party. On behalf of the initiating party, first and second tokens (41, 45) are generated, each of which represents some but not all of the confidential information. The first token is sent electronically via a nonsecure communication network (40) from the initiating party to the verifying party. Verification information is sent electronically via a nonsecure communication network from the verifying party to the verification-seeking party. In another aspect, different pieces of a message may be deliberately sent by different routes to reduce the chances of the pieces all being picked up at a node along the route.



**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AM	Armenia	GB	United Kingdom	MW	Malawi
AT	Austria	GE	Georgia	MX	Mexico
AU	Australia	GN	Guinea	NE	Niger
BB	Barbados	GR	Greece	NL	Netherlands
BE	Belgium	HU	Hungary	NO	Norway
BF	Burkina Faso	IE	Ireland	NZ	New Zealand
BG	Bulgaria	IT	Italy	PL	Poland
BJ	Benin	JP	Japan	PT	Portugal
BR	Brazil	KE	Kenya	RO	Romania
BY	Belarus	KG	Kyrgyzstan	RU	Russian Federation
CA	Canada	KP	Democratic People's Republic of Korea	SD	Sudan
CF	Central African Republic	KR	Republic of Korea	SE	Sweden
CG	Congo	KZ	Kazakhstan	SG	Singapore
CH	Switzerland	LJ	Liechtenstein	SI	Slovenia
CI	Côte d'Ivoire	LK	Sri Lanka	SK	Slovakia
CM	Cameroon	LR	Liberia	SN	Senegal
CN	China	LT	Lithuania	SZ	Swaziland
CS	Czechoslovakia	LU	Luxembourg	TD	Chad
CZ	Czech Republic	LV	Latvia	TG	Togo
DE	Germany	MC	Monaco	TJ	Tajikistan
DK	Denmark	MD	Republic of Moldova	TT	Trinidad and Tobago
EE	Estonia	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	UG	Uganda
FI	Finland	MN	Mongolia	US	United States of America
FR	France	MR	Mauritania	UZ	Uzbekistan
GA	Gabon			VN	Viet Nam

- 1 -

PROVIDING VERIFICATION INFORMATION  
FOR A TRANSACTION  
Background

5 This invention relates to providing verification information for a transaction.

For example, as seen in Figure 1, a consumer at a remote terminal 12 in a network 10 may electronically make a credit card purchase from a merchant 16 by 10 entering a credit card number 25 and expiration date 27 of the credit card through a keyboard 24 or a swiping device 26 (which reads an encoded metallic stripe on the card) attached to the terminal 12. Alternatively, a "smart" credit card with a built-in programmable 15 microchip may be read by a smart card reader 8. The credit card number and expiration date may be transmitted along with the consumer's purchase order 9 (which has also been entered into the terminal) over unsecure telephone lines 31 (via the switched public telephone 20 network 33) between the terminal's modem 14 and the merchant's modem 18. At the merchant's end, a terminal 17 receives the information and stores it pending verification. The merchant verifies the purchase by electronically transmitting from terminal 17 via modem 18 25 and via the switched public telephone network 33 the credit card number 25 and the price of the order to a terminal 21 at the verification agent of the consumer's credit card company 20 via its modem 22. The merchant's terminal 17 receives back from the verification agent's 30 terminal 21 an authorization code 36 which guarantees payment from the credit card company. The merchant then ships the goods.

- 2 -

Summary

The invention provides a way to pass confidential information over an unsecured network with reduced risk of it being captured by an untrusted party.

- 5        Thus, in general, in one aspect, the invention features a method and apparatus for giving verification information with respect to a transaction between an initiating party and a verification-seeking party, the verification information being given by a third,
- 10      verifying party, based on confidential information in the possession of the initiating party. On behalf of the initiating party, first and second tokens are generated, each of which represents some but not all of the confidential information. The first token is sent
- 15      electronically via a nonsecure communication network from the initiating party to the verification-seeking party. The second token is sent electronically via a nonsecure communication network from the initiating party to the verifying party. The confidential information is
- 20      verified at the verifying party based on the first and second tokens. Verification information is sent electronically via a nonsecure communication network from the verifying party to the verification-seeking party.

Implementations of the invention may include one  
25 or more of the following features. At least some of the confidential information may be stored at the verifying party. The verifying may be done by comparing the information represented by the first and second tokens with at least some of the stored confidential  
30 information. The tokens together may represent all of the confidential information. The tokens may include tags identifying the tokens as being related. The tags may be identical and may be randomly generated. The verifying may include associating the tokens with each  
35 other based on the tags. The tokens may include actual

- 3 -

pieces of the confidential information, and an indication of the order that the two pieces occupy in the confidential information. The two tokens may be of essentially equal size. The tokens need not be sent from 5 the initiating party one immediately after the other. The confidential information may include an identification number, e.g., a credit card number. The transaction may include a purchase, the initiating party may be a consumer, the verifying party may be a 10 verification agent of a credit card company, and the verification-seeking party may be a merchant. Additional non-confidential information related to the transaction may be sent from the initiating party to the verification-seeking party. The additional information 15 may include an expiration date of a credit card and a purchase order.

In general, in another aspect, the invention features sending a digital message from a source to a destination via a packet switching network. The message 20 is split into pieces that are sent from the source to the destination in different ones of a set of packets. The routing of different ones of the packets is controlled to reduce the likelihood of the different packets traveling together or via the same route. In implementations of 25 the invention, the message may include a credit card number and the pieces may include portions of the number. The controlling may be done at the source.

Advantages of the invention may include one or more of the following. The confidential information may 30 be sent via non-secure communications links because the entire block of confidential information (e.g., the credit card number) is not available on any one link at a given time. It is only available as an entire block in the hands of the initiator (e.g., the credit card holder)

- 4 -

and the verifying agent, and not to the verification-seeking party (e.g., a merchant).

Other advantages and features of the invention will become apparent from the following description and 5 from the claims.

Description

Figures 1, 2, and 4 are block diagrams of terminals and a network.

Figure 3 is a flow diagram showing changes in data 10 sent in a nonsecure communication network for a secured credit card transaction.

As seen in Fig. 2, to provide security in the transmission of a credit card number over an open network including, for example, the Internet 40, in connection 15 with a purchase transaction, the credit card number may be split into two pieces. Only one piece 41 is sent to the merchant 16, and the other 45 is sent to the verification agent 20. An identification tag 43 is attached to each piece to permit later identification and 20 reassembly of the credit card number by the verification agent 20. After the merchant 16 has received the consumer's order, the card expiration date, the tagged piece of the credit card number, and the price of the order are sent to the verification agent 20 via the 25 Internet 40. The verification agent 20 combines the tagged pieces of the credit card number to reconstruct the number, checks the consumer's credit, and issues an approval code 36 to the merchant 16. In this process, only the customer and the verification agent 20 ever have 30 possession of the complete credit card number.

Referring also to Fig. 3, the process begins when the consumer enters his credit card number 30 (e.g., a ten digit string), the expiration date of the credit card, and a purchase order (step 100). Software 29 (Fig. 35 2) running on computer 12 splits the number 30 into the

- 5 -

two pieces 32a and 32b, e.g., two pieces of equal length (each five digits) (step 102). The software 29 also stores the network addresses of the merchant 16 and the verification agent 20. Alternatively, a smart credit card with a microchip may contain the accessing software and information such as the relevant network addresses.

The software 29 includes a random number or character generator 28 which issues a four-digit pseudorandom tag 34 (step 104). The same tag 34 is added 10 to both pieces 32a and 32b of the credit card number (step 106). The random tag 34 is attached to the end of one piece 32a and to the beginning of the other piece 32b, so that the verification agent 20 may easily tell which piece comes first in reconstructing credit card 15 number 30.

The pseudorandom tag 34 may contain more than four digits. The tag 34 may be distinguished from the number by introducing an alphabetic character into the tag or by separating the shorter tag from the longer number by a 20 string of zeros. Use of a pseudorandom tag 34 reduces the chance that someone monitoring the output of the computer 12 for the purpose of attempting to steal the credit card number 30 will be able to predict which tag will be used.

25 Computer 12 sends two separate packages of information via modem 14. One package holds the first tagged piece 32a and is sent directly to the verification agent 20 at its network address (step 108). The verification agent 20 receives the tagged piece 32a via 30 its modem 22, and stores the tagged piece 32a for later recall.

The other package holds the second tagged piece 32b and is sent over the network (step 110) to the merchant 16 at its network address, along with the 35 consumer's purchase order (including the consumer's name

- 6 -

and address), credit card expiration date, and identification of the consumer's credit card company. The merchant's terminal may store the network address of the verification agent 20, or the address may be 5 generated by computer 12 and sent to merchant 16 with the consumer's purchase order.

The two packages may be sent in either order. Allowing a time interval (of say 30 seconds) to pass between sending the two packages decreases the likelihood 10 that both pieces 32a and 32b will be intercepted and recognized by their random tags (step 109).

Merchant 16 receives the tagged piece 32b and the other information at its modem 18 for storage and processing. The merchant 16 may prepare the consumer's 15 order while waiting for an approval number from the verification agent 20. The merchant 16 does not know the consumer's entire credit card number 30, and for that and other reasons it must obtain approval from the verification agent 20 before it ships the consumer's 20 order to ensure that it will receive payment.

Accordingly, the merchant 16 sends piece 32b along with the price of the consumer's order from its modem 18 to the modem 22 of the verification agent 20 over the network 10 (step 112) or by direct telephone line 7 (Fig. 25 2) from the merchant 16 to the verification agent 20 outside the network 10.

The verification agent's terminal 21 compares the tag 34 of piece 32b to the tags of other pieces of credit card numbers 23 it has received over the network 10 (step 30 114). The tags in the pieces of credit card numbers received by the verification agent 20 are isolated by pattern recognition and matching or through a convention that the tag is always at the beginning or end of the number. When the tags 34 of two received pieces 32a and 35 32b are found to match, the verification agent 20 removes

- 7 -

the tag from the end of piece 32a and the tag from the beginning of piece 32b and recombines the pieces in that sequence to obtain the consumer's credit card number 30 (step 116).

5       The verification agent 20 may then perform a credit check on the consumer's account (step 118). If the purchase is approved, the verification agent 20 sends an approval code 36 to the merchant 16 over the network 10 or by the direct telephone line 7 between the  
10 verification agent 20 and the merchant 16 (step 120). Later, the merchant 16 will present the transaction for payment, including the tagged piece 32b, the approval code 36, the price, and an identification of the goods. The credit card company will debit the consumer's credit  
15 card account for the price of that order and credit the merchant's account. If the purchase is not approved, the merchant 16 is so notified and will refuse the consumer's purchase order.

Using this procedure, the merchant 16 never  
20 receives the entire credit card number 30, but rather only a tagged piece 32b and an approval code 36 which need not bear any relation to the credit card number 30 itself. The credit card number 30 is never available as a whole except at the consumer's computer 12 and at the  
25 verification agent 20.

The TCP/IP or ISO protocols used for packet transmission are designed to lead to the best routing of packets over the network. For this reason it is likely that the two parts of, e.g., the credit card number  
30 carried in the two packets may be sent along the same route most of the way (they may even travel together, one after the other) and therefore pass through the same nodes along the route. This may make it possible for some node along those nodes to collect all of the  
35 packets that make up the credit card number (or other

- 8 -

information) as they pass through the node, and thus to reassemble the credit card number.

To prevent this, it would be possible to add, to the software in the computer which is the originator of 5 the packets that contain the pieces of the message, routines whose purpose is to configure the packets under the protocol in a way that makes it more likely (even highly likely or certain) that the packets will traverse different routes to their destinations as soon as they 10 leave the originating computer. This could entail changing the route generation routines to assure different routes or different portions of routes. The changes could be made within a layer of the protocol or by addition of another layer. The objective would be to 15 increase the likelihood or assure that packets associated with a given message do not travel together and/or do not take the same route through the network.

The same approach may be applied to any message that is to be or is susceptible to be broken into parts. 20 The message could be broken down as individual words, or characters, or bytes, or even individual bits, with each piece carried in its own packet and the protocol reducing the likelihood that they will take the same paths or travel together. This would make the message highly 25 secure even without encryption.

Thus, in Figure 4, the characters X of one piece of the consumer's credit card number would each be sent by a different route as would the characters Y of the other piece.

30 The controlling of the routing could be done in a way that assures divergent paths for only part of the routes to the destination and the controlling could be done in nodes downstream of the source node.

Other embodiments are within the scope of the 35 following claims. The piece splitting may be used in

- 9 -

other kinds of financial transactions. The technique could be used in a wide range of applications to protect confidential information. Also, more than three parties could be involved. More than three pieces could be used.

- 5 The method could be used with any unsecured communication medium.

What is claimed is:

- 10 -

Claims

1. A method for giving verification information with respect to a transaction between an initiating party and a verification-seeking party, the verification information being given by a third, verifying party, based on confidential information in the possession of the initiating party, the method comprising:
  - on behalf of the initiating party, generating first and second tokens each of which represents some but not all of the confidential information,
  - 10 sending the first token electronically via a nonsecure communication network from the initiating party to the verification-seeking party,
  - sending the second token electronically via a 15 nonsecure communication network from the initiating party to the verifying party,
  - verifying the confidential information at the verifying party based on the first and second tokens, and sending the verification information
  - 20 electronically via a nonsecure communication network from the verifying party to the verification-seeking party.
2. The method of claim 1 further comprising storing, at the verifying party, at least some of the confidential information, and wherein
  - 25 the verifying is done at the verifying party by comparing the information represented by the first and second tokens with at least some of the stored confidential information.
3. The method of claim 1 wherein the first and 30 second tokens together represent all of the confidential information.
4. The method of claim 1 wherein the first and second tokens include tags identifying the first and second tokens as being related.

- 11 -

5. The method of claim 4 wherein the tags in the two tokens are identical.

6. The method of claim 4 further comprising generating the tags randomly.

5 7. The method of claim 4 wherein the verifying comprises associating the first and second tokens with each other based on the tags.

8. The method of claim 1 wherein the tokens include

10 pieces of the confidential information, and an indication of the order of the two pieces in the confidential information.

9. The method of claim 1 wherein the two tokens are of essentially equal size.

15 10. The method of claim 1 wherein the first token and the second token are not sent from the initiating party one immediately after the other.

11. The method of claim 1 wherein the confidential information comprises an identification  
20 number.

12. The method of claim 1 wherein the confidential information comprises a credit card number.

13. The method of claim 12 further comprising sending additional non-confidential information related  
25 to the transaction from the initiating party to the verification-seeking party.

- 12 -

14. The method of claim 13 wherein the additional information comprises an expiration date of a credit card.

15. The method of claim 13 wherein the additional information comprises a purchase order.

16. The method of claim 1 wherein the transaction comprises a purchase, the initiating party is a consumer, the verifying party is a verification agent of a credit card company, and the verification-seeking party is a merchant.

17. The method of claim 1 further comprising sending additional non-confidential information related to the transaction from the initiating party to the verification-seeking party.

18. The method of claim 17 wherein the additional information comprises an expiration date of a credit card.

19. The method of claim 17 wherein the additional information comprises a purchase order.

20. A method for enabling a consumer to conduct a credit card transaction with a merchant via a nonsecure communication medium comprising:

21 sending a first token electronically via the communication medium from the consumer to the merchant,  
22 the first token including a piece of a credit number of the consumer and a tag that identifies the first token,  
23 sending a second token electronically via the communication medium from the consumer to a verification agent, the second token including a piece of the

- 13 -

consumer's credit number and a tag that identifies the second token,

the pieces of the consumer's credit number together incorporating all of the credit number,

5 the tags indicating an association of the two tokens with one another,

storing the consumer's credit number at the verification agent,

10 sending the first token electronically via the communication medium from the merchant to the verification agent, and

at the verification agent:

associating the first and second tokens based on the tags,

15 deriving the credit number from the tokens, and

sending verification information from the verification agent to the merchant.

21. A method for giving verification information with respect to a transaction between an initiating party and a responding party, the verification being given by a third, authorizing party, based on confidential information in the possession of the initiating party, the method comprising:

25 on behalf of the initiating party, generating first and second tokens each of which represents some but not all of the confidential information,

sending the first token electronically via a nonsecure communication network from the initiating party 30 to the responding party,

sending the second token electronically via a nonsecure communication network from the initiating party to the authorizing party,

- 14 -

verifying the confidential information at the authorizing party based on the first and second tokens, and

5 sending verification information electronically via a nonsecure communication network from the authorizing party to the responding party.

22. A method for giving verification information with respect to a transaction between an initiating party and a verification-seeking party, the verification 10 information being given by a third, verifying party, based on confidential information in the possession of the initiating party, the method comprising:

on behalf of the initiating party, generating first and second tokens each of which represents some but 15 not all of the confidential information,

on behalf of the initiating party, sending the first and second tokens electronically via a nonsecure communication network,

20 collecting the first and second tokens at the verifying party, verifying the confidential information at the verifying party based on the first and second tokens, and sending the verification information electronically via a nonsecure communication network from 25 the verifying party to the verification-seeking party.

23. A method for sending confidential information from an initiating party to a receiving party comprising:

30 on behalf of the initiating party, generating first and second tokens each of which represents some but not all of the confidential information,

sending the first token electronically via a nonsecure communication network from the initiating party to the receiving party,

- 15 -

sending the second token electronically via a nonsecure communication network to a remote destination which is not related to the initiating party and the receiving party,

5 sending the second token electronically via a nonsecure communication network from the remote destination to the receiving party, and

recovering the confidential information at the receiving party based on the first and second tokens.

10 24. A method of sending a digital message from a source to a destination via a packet switching network comprising

15 splitting the message into pieces,  
sending each of the pieces from the source to the destination in a different one of a set of packets, and  
controlling the routing of different ones of the packets to reduce the likelihood of the different packets traveling together or via the same route.

25. The method of claim 24 in which the message  
20 comprises a credit card number and the pieces comprise portions of the number.

26. The method of claim 24 in which the controlling is done at the source.

1/4

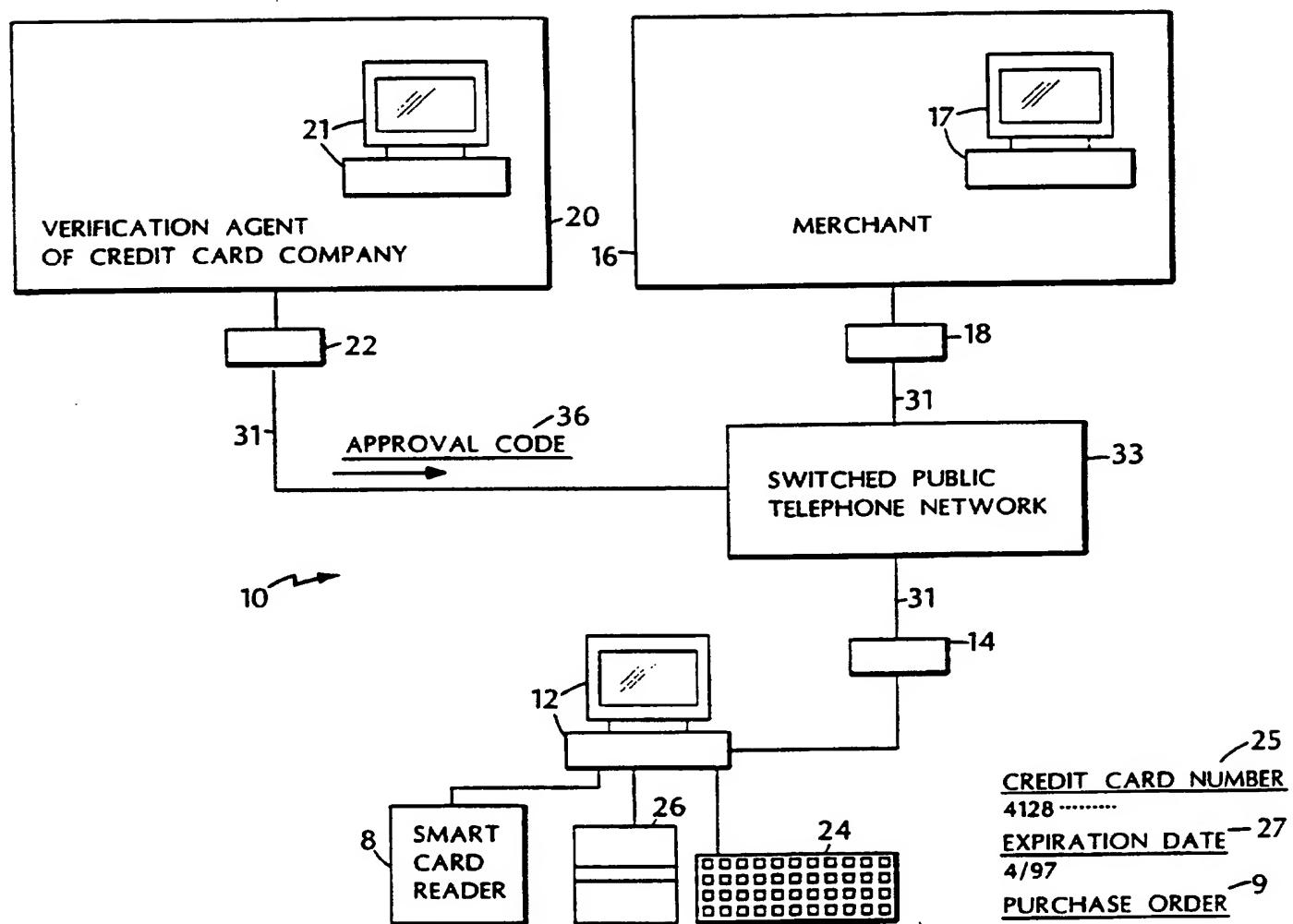


FIG. 1

2/4

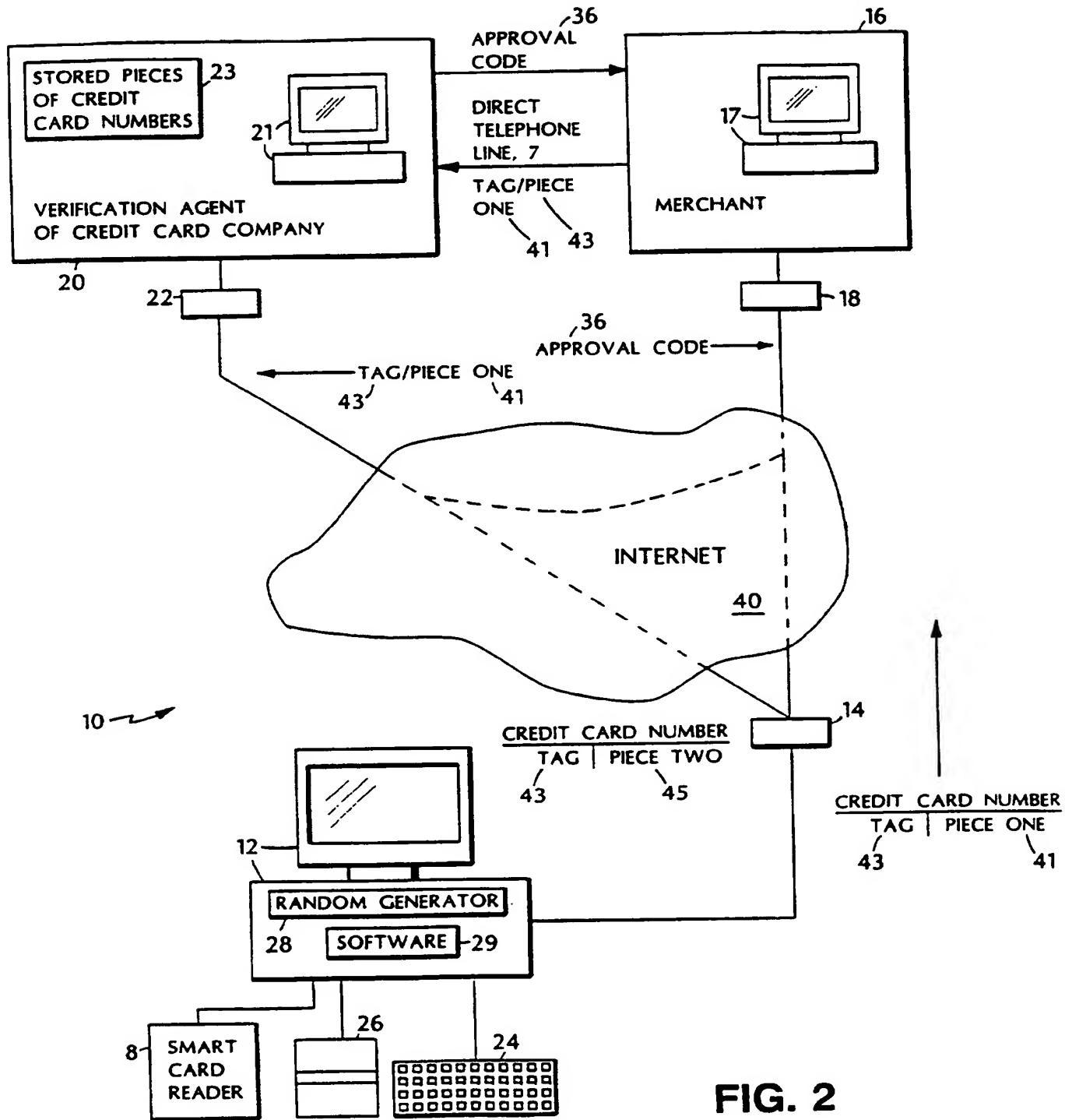
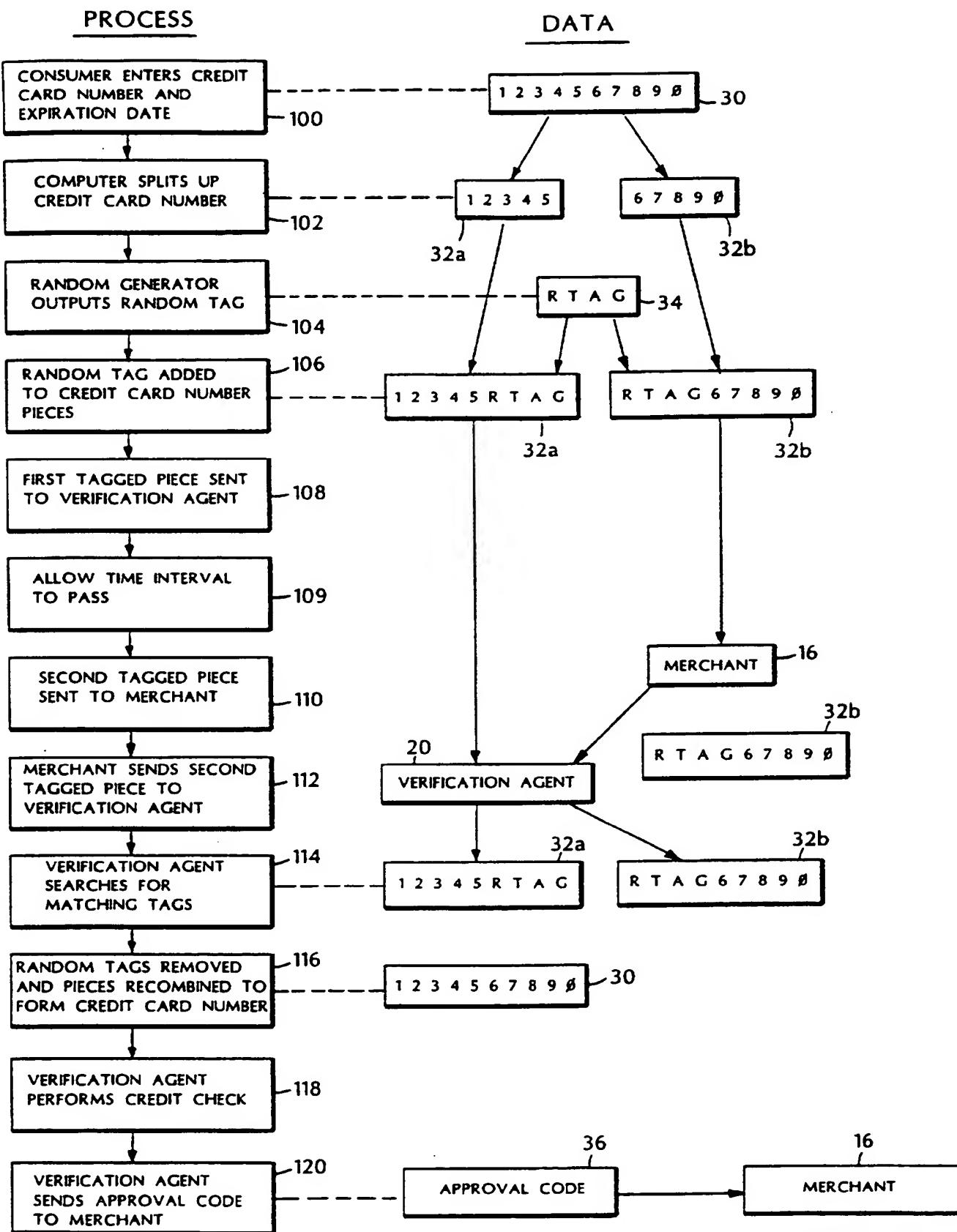


FIG. 2

3/4

**FIG. 3**

4/4

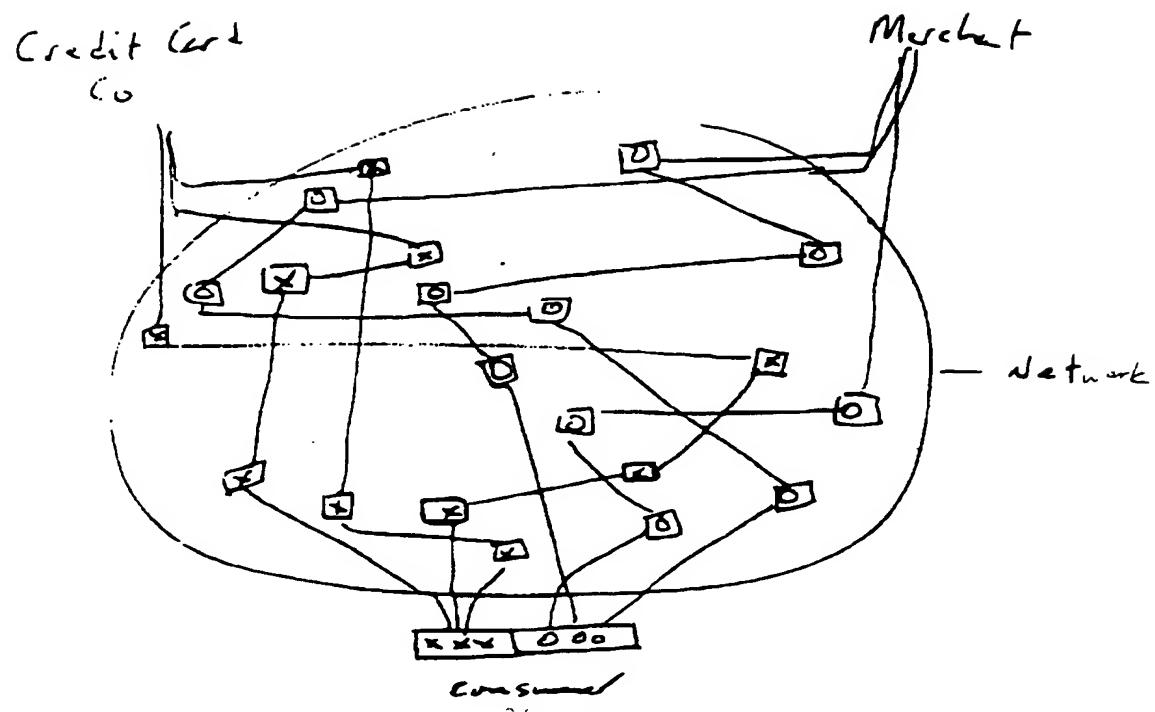


FIGURE A

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/03716

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :G06F 17/60; G06G 7/52; G06K 5/00; H04K 1/10  
US CL :364/408, 401; 235/375, 380, 381; 380/33

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 364/408, 401; 235/375, 380, 381; 380/23, 24, 25, 33, 49

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,498,000 (DECAVELE et al.) 05 FEBRUARY 1985 see entire document	1-26
A	US, A, 4,679,236 (DAVIES) 07 JULY 1987 see entire document	1-26

Further documents are listed in the continuation of Box C.

See patent family annex.

• Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reasons (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

09 JUNE 1996

Date of mailing of the international search report

02 JUL 1996

Name and mailing address of the ISA/US  
Commissioner of Patents and Trademarks  
Box PCT  
Washington, D.C. 20231

Authorized officer,  
DONALD E. MC ELHENY JR.

Faxsimile No. (703) 305-3230

Telephone No. (703) 305-3800

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/03716

## B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

APS

search terms: third party, verifi?, verify?, authoriz?, partial, part, parts, token#, tag#

DIALOG

search terms: thirs party, verifi?, verify?, authoriz?, partial, part, parts, credit card, internet